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Education

- PhD in physics, Massachusetts Institute of Technology, 2008. Advisor: Edward Farhi. Thesis: *Quantum Computation Beyond the Circuit Model*.
- BS in physics, Pennsylvania State University, 2003. Honors thesis: *Simulating the Inversion of Graphene Nanocones*.

Research Experience

- April 2011-Present: Physicist at National Institute of Standards and Technology (NIST).
- 2014-Present: Fellow of the NIST/U. Maryland Joint Center for Quantum Information and Computer Science (QuICS) and adjunct assistant professor in University of Maryland Institute for Advanced Computer Studies (UMIACS).
- September 2008-April 2011: Sherman Fairchild Prize Postdoctoral Fellow, Caltech. Advisor: John Preskill.
- June/July 2008: Visiting researcher, RIKEN Institute for Chemistry and Physics, Wakoshi, Japan. Host: Franco Nori.
- 2005-2008: QuaCGR Fellowship for Quantum Computing. Advisor: Edward Farhi.
- 2003-2004: MIT Presidential Fellow.
- Summers, 2000-2003: REU (Research Experiences for Undergraduates) program at Penn State. Advisors: Vincent Crespi, Moses Chan, and Rafael Garcia.

Teaching Experience

- Summer 2014: Instructor, Quantum Algorithms Short Course, NIST.
- Winter 2013/2014: Lecturer at Israel Institute for Advanced Studies Winter School in Theoretical Physics.
- Spring 2005,2006,2007: Writing Assistant, MIT 8.06: Quantum Mechanics III, Prof. Krishna Rajagopal and Prof. Hong Liu
- Fall 2004/Spring 2005: Teaching Assistant, MIT 8.14/8.15: Experimental Physics I & II, Prof. Ulrich Becker and Prof. Isaac Chuang

Awards

NIST Information Technology Laboratory Outstanding Journal Paper Award, 2013
Sherman Fairchild Prize Fellowship, Caltech Physics, 2008
QuaCGR Fellowship, 2005
MIT Presidential Fellowship, 2003
Braddock Scholarship, Penn State, 1999-2003
Robert C. Byrd Scholarship, 1999-2003
Schreyer Honors College, Penn State, 1999-2003
Phi Beta Kappa
Jean Bennett Award, Penn State Physics, 2003

Talks

- "Black Holes, Causality, and Grover Search" University of California San Diego quantum information seminar. June 24, 2015.
- "Quantum Computation: From Philosophy to Technology in One Generation" Keynote, Qualcomm QTech forum, San Diego, CA. June 23, 2015.
- "Device-independently Secure Randomness Expansion Using Photonic Bell Tests" Randomness in Quantum Physics and Beyond, Barcelona, Spain. May 7, 2015.
- "Quantum Adiabatic Optimization and Spectral Graph Theory" Hebrew University quantum information seminar, Jerusalem, Israel. February 26, 2015.
- "What is the Computational Power of the Universe?" Israeli-American Kavli Frontiers of Science Symposium, Jerusalem. February 25, 2015.
- "Quantum Algorithms for Applied Mathematics" Department of Energy ASCR Workshop on Quantum Computing, Plenary session, February 17, 2015.
- "Quantum Algorithms" (series of three lectures). Israel Institute for Advanced Studies Theoretial Physics Winter School. December 30 & 31, 2013 and January 5, 2014.
- "Partial-indistinguishability Obfuscation Using Braids"
  - U. Maryland Crypto Reading Group, College Park, MD. March 7, 2014.
  - PIQUDOS Seminar, Perimeter Institute, Waterloo, ON. April 8, 2013.
  - Hughes Research Laboratory, Malibu, CA. January 17, 2013.
  - IQIM Seminar, Caltech, Pasadena, CA. January 8, 2013.
- "Super-polynomial Quantum Speedups Tutorial," Lorentz Center, Leiden, Netherlands. Nov 5, 2012.
- "Computational Complexity of Quantum Field Theory"
  - Stanford Institute for Theoretical Physics seminar, Palo Alto, CA. May 22, 2015.
  - Los Alamos National Laboratory quantum information seminar, Los Alamos, NM. April 23, 2015.
  - APS March Meeting, Invited Session, San Antonio, TX. March 2, 2015.
- "Quantum Algorithms for Simulating Quantum Field Theories"
  - Advances in Quantum Algorithms and Computation, Aspen, CO. March 14, 2014.
  - Ben-Gurion University Physics Colloquium, Be'er Sheva, Israel. January 8, 2014.
  - Quantum Information Processing (QIP '13), Tsinghua University, Beijing. January 24, 2013. [Plenary Lecture]
  - University of Pennsylvania Physics Colloquium, Philadelphia, PA. December 5, 2012.
  - Capital Area Theory Seminar, U. Maryland, College Park, MD. April 6, 2012.
  - C. N. Yang Institute Seminar, SUNY Stony Brook, NY. March 8, 2012.

- NIST Applied and Computational Mathematics Seminar, Gaithersburg, MD. February 21, 2012.
- MIT Center for Theoretical Physics Special Seminar, Cambridge, MA. February 15, 2012.
- NASA Quantum Future Technologies Conference, Mountainview, CA. January 21, 2012.
- Workshop on Quantum Cryptanalysis, Schloss Dagstuhl, Germany, September 23, 2011.
- Institute for Quantum Computation Lunch Seminar, Waterloo, Canada. August 2, 2011.
- NIST Quantum Information and Bose Einstein Condensate Seminar, Gaithersburg, MD. July 13, 2011.
- Laboratory for Physical Science Special Seminar, University Park, MD. May 5, 2011.

- "Limitations of Quantum Fourier Sampling," NIST Post-Quantum Cryptography Seminar, Gaithersburg, MD. December 20, 2013.
- "Quantum Algorithms for the Subset-Sum Problem," NIST Post-Quantum Cryptography Seminar, Gaithersburg, MD. April 26, 2013.
- "Quantum Computation of Zeta Functions of Curves," NIST Post-Quantum Cryptography Seminar, Gaithersburg, MD. February 22, 2013.
- "Attacks on NTRUEncrypt," NIST Post-quantum Cryptography Seminar, Gaithersburg, MD. April 23, 2012.
- "Quantum Computation and Lattice Based Cryptography," NIST Cryptography Club Seminar, Gaithersburg, MD. May 25, 2011.
- "QMA-complete Problems and Universal Adiabatic Computation with Stoquastic Hamiltonians" Abdus Salam International Center for Theoretical Physics, Trieste, Italy. June 15, 2010.
- "Quantum Algorithms for Topological Invariants"
  - NIST Mathematical and Computational Sciences Division Seminar Series, Gaithersburg MD. February 3, 2010.
  - Sandia National Laboratories, Albuquerque NM. February 23, 2010.
- "Gadgets and Gizmos for Adiabatic Quantum Computation" Kavli Institute Program in Quantum Information Science, Santa Barbara. September 17, 2009.
- "QMA-complete Problems for Stoquastic Hamiltonians and Markov Matrices" Workshop on Quantum Computation and Quantum Spin Systems. Erwin Schrödinger Institute, Vienna. August 10, 2009.
- "Permutational Quantum Computation"
  - Twelfth Annual Southwest Quantum Information and Technology (SQuInT) Workshop. Santa Fe, NM. February 20, 2010.

- Conference on Complexity Resources in Quantum Computation, Oxford, August 25, 2009.
- Vladimir Buzek group meeting, Slovak Academy of Sciences, August 18, 2009.
- Todd Brun group meeting, USC, July 14, 2009.
- Alan Aspuru-Guzik group meeting, Harvard, May 12, 2009.
- Quantum Information Seminar, MIT, May 11, 2009.
- Quantum Lunch Seminar, UC Berkeley, April 17, 2009.
- PIQUDOS Seminar, Perimeter Institute, Waterloo, ON. April 3, 2009.

- "Quantum Computation and Jones Polynomials" RIKEN Quantum Seminar. Wako-shi, Japan. July 15, 2008.
- "Locality and Fault Tolerance of Adiabatic Quantum Computation" Workshop on quantum computation and solid state systems, RIKEN, Wako-shi, Japan. June 9, 2008.
- "Perturbative Gadgets at Arbitrary Orders" Workshop on Universal Adiabatic Quantum Computation. D-Wave Systems, Burnaby, British Columbia. March 18, 2008.
- "Improved Fault Tolerance for Adiabatic Quantum Computers" Quantum Error Correction (QEC) 2007. University of Southern California, December 19 2007.
- "Estimating Jones Polynomials is a Complete Problem for One Clean Qubit" PIQUDOS Seminar, Perimeter Institute, October 31, 2007.
- "Quantum Computing Beyond the Circuit Model" ARO Program Review. Minneapolis, MN. August 17, 2007.
- "Error Correcting Codes for Adiabatic Quantum Computation" PIQUDOS Seminar, Perimeter Institute, July 18, 2007.
- "Quantum Gradient Estimation and Classical Optics" Workshop on Quantum Computational Methods for Differential Equations and Physics Problems, Los Alamos National Laboratory, May 25, 2007.
- "Error Correcting Codes for Adiabatic Quantum Computation"
  - Institute for Quantum Information (IQI) Seminar, Caltech, January 9, 2007.
  - Quantum Information Processing (QIP) 2007. University of Queensland, Brisbane Australia. Feb 2, 2007.
- "Quantum Blackbox Algorithms" MIT Center for Theoretical Physics Graduate Seminar. Cambridge, MA. Sep 23, 2005.
- "Fast Quantum Algorithm for Numerical Gradient Estimation," International Seminar on Continuous Algorithms and Complexity, Schloss Dagstuhl, Germany, Sept 2004.
- "Simulating the Inversion of Carbon Nanocones" APS March Meeting. Austin, TX. March 7, 2003.

Service and Outreach

- Author and maintainer of the "Quantum Algorithm Zoo," an online repository of all known quantum algorithms. (`http://math.nist.gov/quantum/zoo/`)
- Member of Quantum Information Science Interagency Working Group (US executive branch), 2015.
- Member of Department of Energy study group on grand challenges at the interface of quantum information science, particle physics, and computing, 2015.
  (Report at `http://goo.gl/rpCTDK`)
- Panelist at National Science Foundation Conference on Mathematical Challenges in Quantum Information, Feb 12-13, 2015.
- Referee for Physical Review, Nature, STOC, FOCS, Quantum Information and Computation, Proceedings of the Royal Society, Quantum Information Processing, SIAM Journal on Computing, Theory of Computing, New Journal of Physics, Quantum Topology, and Communications in Mathematical Physics.
- Developer of software to run the NIST/U. Maryland Quantum Information Journal Club (a web application written in PHP).
- National Science Foundation reviewer.
- Co-organizer NIST-UMD Workshop on Quantum Information and Computer Science. (Held March 31 and April 1, 2014.)
- Organizer QuICS Workshop on Frontiers of Quantum Information and Computer Science. (To be held Sept 28-Oct 2, 2015).
- Member, QuICS executive committee.
- Program committee member, Quantum Information Processing (QIP) 2013.
- Member, MetaMed scientific advisory board.
- Member, Cryptoworks21 (NSERC Training Program in Cryptographic Infrastructure)
- AAAS Science podcast, June 1, 2012. (`http://bit.ly/KI5NyX`) and YouTube video "Helping Quantum computers Study the Physics of the Universe" (`http://bit.ly/MD87Me`)
- Speaker at University of Maryland SPIRAL program for undergraduate math majors at minority serving institutions, 2011 and 2012.
- Organizer of MIT quantum computing journal club, Fall 2005-Spring 2008.

Papers and Preprints

[29] Michael Jarret and Stephen P. Jordan
Modulus of continuity eigenvalue bounds for homogeneous graphs and convex subgraphs with applications to quantum Hamiltonians
arXiv:1506.08475

[28] Michael Jarret and Stephen P. Jordan
Adiabatic optimization without local minima
Quant. Inf. & Comp. 14(3/4):0181-0199 (2015) [arXiv:1405.7552]

[27] Stephen P. Jordan, Keith S. M. Lee, and John Preskill
Quantum algorithms for fermionic quantum field theories
arXiv:1404.7115

[26] Michael Jarret and Stephen P. Jordan
The fundamental gap for a class of Schrödinger operators on path and hypercube graphs
J. Math. Phys 55(5):052104 (2014) [arXiv:1403.1473]

[25] Stephen P. Jordan
Strong equivalence of reversible circuits is coNP-complete
Quant. Inf. & Comp. 14(15/16):1302–1307 (2014) [arXiv:1307.0836]

[24] Gorjan Alagic, Stacey Jeffery, and Stephen Jordan
Partial-indistinguishability obfuscation using braids
Proceedings of TQC2014 [arXiv:1212.6358]

[23] Gorjan Alagic, Aniruddha Bapat, and Stephen Jordan
Classical simulation of Yang-Baxter gates
Proceedings of TQC2014 [arXiv:1407.1361]

[22] Adam Bookatz, Stephen Jordan, Yi-Kai Liu, and Pawel Wocjan
Quantum nonexpander problem is quantum-Merlin-Arthur-complete
Phys. Rev. A 87, 042317 (2013) [arXiv:1210.0787]

[21] Stephen P. Jordan, Keith S. M. Lee, and John Preskill
Quantum computation of scattering in scalar quantum field theories
Quant. Inf. & Comp. 14(11/12):1014–1080 (2014) [arXiv:1112.4833]

[20] Stephen P. Jordan, Keith S. M. Lee, and John Preskill
Quantum algorithms for quantum field theories
Science **336**, No. 6085, pg. 1130-1133. (2012)
[arXiv:1111.3633]

[19] Stephen P. Jordan, Hirotada Kobayashi, Daniel Nagaj, and Harumichi Nishimura
Perfect completeness in classical-witness quantum Merlin-Arthur proof systems
Quantum Information and Computation **12**, No. 5/6, pg. 460-470. (2012)
[arXiv:1111.5306]

[18] Stephen P. Jordan and Gorjan Alagic
Approximating the Turaev-Viro invariant of mapping tori is complete for one clean qubit
Proceedings of the Sixth Conference on Theory of Quantum Computation, Communication and Cryptography (TQC 2011). [arXiv:1105.5100]

[17] G. Alagic, S. Jordan, R. Koenig, and B. Reichardt
Approximating Turaev-Viro 3-manifold invariants is universal for quantum computation
Phys. Rev. A 82, 040302(R) (2010) [arXiv:1003.0923]

[16] Stephen P. Jordan, Toufik Mansour, and Simone Severini
On the degeneracy of $SU(2)_3$ topological phases
Russian Journal of Mathematical Physics, **19**(1), 21-26 (2012). [arXiv:1009.0114]

[15] P. Wocjan, S. Jordan, H. Ahmadi, and J. Brennan
Efficient quantum processing of ideals in finite rings
[arXiv:0908.0022]

[14] Stephen P. Jordan
Permutational quantum computing
Quantum Information and Computation **10**, No. 5/6, pg. 470-497. (2009)
[arXiv:0906.2508]

[13] Stephen Jordan, David Gosset, and Peter Love
QMA-complete problems for stoquastic Hamiltonians and Markov matrices
Phys. Rev. A **81**(3), 032331 (2010) [arXiv:0905.4755].

[12] Stephen P. Jordan and Pawel Wocjan
Efficient quantum circuits for arbitrary sparse unitaries
Phys. Rev. A **80**, 062301 [arXiv:0904.2211].

[11] Stephen P. Jordan
Fast quantum algorithms for approximating some irreducible representations of groups
arXiv:0811.0526

[10] Stephen P. Jordan
Quantum Computation Beyond the Circuit Model
Ph.D. Thesis, MIT, 2008. [arXiv:0809.2307]

[9] Stephen P. Jordan and Pawel Wocjan
Estimating Jones and HOMFLY polynomials with One Clean Qubit
Quantum Information and Computation **9**, No. 3/4, pg. 264-289. (2009)
[arXiv:0807.4688]

[8] Stephen P. Jordan and Edward Farhi
Perturbative Gadgets at Arbitrary Orders
Phys. Rev. A **77**, 062329 (2008) [arXiv:0802.1874]

[7] I. Kassal, S. Jordan, P. Love, M. Mohseni, and A. Aspuru-Guzik
Quantum algorithms for the simulation of chemical dynamics
Proc. Natl. Acad. Sci., **105**, No. 48, pg. 18681-18686 (2008). [arXiv:0801.2986]

[6] Peter W. Shor and Stephen P. Jordan
Estimating Jones Polynomials is a Complete Problem for One Clean Qubit.
Quantum Information and Computation **8**, No 8/9, pg. 681-714 (2008) [arXiv:0707.2831]

[5] A. Childs, R. Cleve, S. Jordan, and D. Yonge-Mallo
Discrete Query Quantum Algorithm for NAND trees.
Theory of Computing **5**, pg. 119-122 (2009). [quant-ph/0702160]

[4] Stephen P. Jordan, Edward Farhi, and Peter W. Shor
Error correcting codes for adiabatic quantum computation.
Phys. Rev. A **74**, 052322 (2006) [quant-ph/0512170]

[3] Stephen P. Jordan
Fast quantum algorithm for numerical gradient estimation.
Phys. Rev. Lett. **95**, 050501 (2005) [quant-ph/0405146]

[2] Stephen P. Jordan and Vincent H. Crespi
Mechanical manipulation of graphene nanocones: Chiral inversion of a micron-scale three-dimensional object.
Phys. Rev. Lett. **93**, 255504 (2004)

[1] R. Garcia, S. Jordan, J. Lazzaretti, and M. Chan
Quartz microbalance study of thick He-4 film near the superfluid transition.
J. Low Temp. Phys. **134**(1-2):527-533 Jan 2004

References

Available upon request.